DOCUMENT RESUME

ED 266 781 IR 051 434

AUTHOR Dosa, Marta
TITLE Information Resource Management for Industrial Information Officers.
PUB DATE 85
NOTE 33p.
PUB TYPE Viewpoints (120)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Curriculum Development; Developing Nations; *Educational Planning; Higher Education; Information Needs; *Information Science; *Information Scientists; Library Education; Position Papers; *Professional Education; Scientific and Technical Information; Technology Transfer
IDENTIFIERS *Industrial Development; Information Infrastructure; Information Management; *Information Resources Management

ABSTRACT

This paper argues that the function of educational programs is to convey a sense of reality and an understanding of the open-endedness of information needs and situations; only such a reality orientation can instill the necessary flexibility in information professionals for effectively managing change. There is a growing consensus among policymakers that knowledge, especially data and information in the scientific and high-technology domains, is an indispensable national resource for industrial planning and productivity. Such knowledge needs to be managed effectively like any other resource, and industrial information officers must deal with the ambiguities of information politics, and gradually convince policymakers and top-level managers of the national significance of the information infrastructure. Information Resource Management (IRM) is seen less as a specific professional role than as a new professional approach to rendering all information activities and products more central to national development. The paper includes discussions of the following topics: compelling trends; the impact of information technology; information resources management; information support for innovation; information policies; the use of research in industrial organizations; realities of the workplace; internal policies for information management; user needs and services; planning and assessment; information resources; systems and technology; professional responsibilities; skills and insights; and the IRM curriculum at Syracuse University. (THC)

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INFORMATION RESOURCE MANAGEMENT FOR INDUSTRIAL INFORMATION OFFICERS

Prof. M.L. Dosa /Mrs./
Syracuse University,
School of Information Studies,
Syracuse, NY USA

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

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TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

We are now at the point where we must educate people in what nobody knew yesterday, and prepare in our schools for what some people must know tomorrow.

Margaret MEAD

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Redefining educational needs

In the rapidly changing atmosphere of what the popular press calls the information age, the late scientist's words take on a familiar ring. But as the implications of her statement emerge, we begin to wonder. Is this what education is about? Are we really teaching the value of inventions without the support of cumulative scientific knowledge and tradition? I believe that education has a different purpose and that we must educate information professionals in what some people were dreaming about yesterday, and prepare in our schools for how to translate dreams into probing questions in order to find what people should know tomorrow.

"Dreams" in this context mean the creative thinking of individuals who had the ability to envision not only forthcoming technological changes but also their potential impact to transform the world around us. The worldwide exchange of scientific information, international registries of recorded knowledge and a progressively equal distribution of the benefits of education were some of the elements in this dream. Universal cooperation in using technology and education for the improvement of the quality of human life seemed within reach.

Although too many of the dreams were compromised or have failed, they should not be banned from our educational heritage. In our time which is, at the same time, more realistic and more daring than that of the foreru-ners of the in-

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formation age, the defeated visions of the past urge us to question the reasons for compromises and failures. What happened to the global diffusion of knowledge and its power to bring people together to solve world problems? We need to learn to pursue questions and assess changes so that use of the tools of evaluation becomes an inherent process to education and eventually to professional work. More than anything, information professionals need to develop the capacity to identify and analyze relationships, establish cause and effect links, and assess the potential impact of current decisions.

Initially, the major objective of widespread efforts to revise curricula for the education and training of industrial information officers was to prepare them for work in the microelectronic environment. Gradually, this orientation has been shifting to an emphasis on the ability to assess change and its impact in a given cultural and work environment. Any effort for curriculum revision must take these realities into account. The building of know-how relevant to communication and information hardware should be paralleled by the continuous sharpening of analytic thinking and techniques. Software is a critical element in microelectronics, and software development depends on human ability and skills. Equally important is to build a capacity to assess the impact of both hardware and software on information intermediaries and users according to appropriate standards. This means that in developing countries the planning and implementation of information systems should be evaluated in the context of cultural and development goals. What we need most is to foster an understanding of technology and system assessment, participatory planning, the monitoring of user needs and awareness of international relations. Focusing educational development on the principles of questioning, analysis and interpersonal communication may lead us not to what in Margaret MEAD's words "some people must know tomorrow", but to what all information professionals need to understand and practice: the management

of information resources on behalf of human and societal goals. As Juan F. RADA stated: "More than legislation and protocols, a new atmosphere of social command of technologies should be developed" /1/.

This paper was motivated by the assumption that the function of educational programs is to convey a sense of reality and an understanding of the open-endedness of information needs and situations. Only such reality orientation can induce the necessary flexibility in information professionals for effectively managing change.

There is now a growing, albeit often puzzled consensus among policy makers that knowledge, especially in the scientific and high-technology domains, is an indispensable national resource for industrial planning and productivity. That data and information - the raw materials of knowledge - need to be managed effectively like any other resource, is a less widely accepted principle. It is the predicament of industrial information officers to deal with the ambiguities of information politics, and it is their responsibility to gradually convince policy makers and top-level managers of the national significance of the information infrastructure. Thus information resource management /IRM/ may be seen less as a specific professional role than as a new professional approach to rendering all information activities and products more central to national development. We hope that the philosophy and strategies of meeting this challenge will come from new educational programs undergirded by empirical research in information science.

The following discussion will also include references to a Master of Science in Information Resource Management program currently in operation. However, this paper's purpose is to identify emerging professional insights rather than a course-by-course account of a curriculum.

Compelling Trends

Educational goals cannot be redefined in a vacuum. There are certain trends, either sweeping across the surface of our

daily lives as media events or permeating our entire professional experience as powerful attitudinal changes, that affect all educational planning. Both kinds of influences compel us to search for solutions beyond ad-hoc curricular revisions.

Recent decades brought significant changes to the research and development process including data collection and applications. Most policy makers begin to perceive information as a resource for national development. "The modern industrial state is a complex held together by information" /2/. While in the past activities relating to the handling of information products were fragmented and labeled according to the ingrained notions of traditional professions and occupations /statisticians, demographers, accountants, engineers, geographers, librarians, documentalists, archivists, surveyors, etc./, today we see the entire cycle of knowledge production, transmission, use and application as a continuum /3,4/ /Figure 1/.

It has often been observed that certain phenomena in society tend to influence the characteristics of knowledge and the various ways of its usage. These phenomena include the crossdisciplinary nature of scientific research; the persistent gap between research findings and their technological applications; and the industrial decision maker's need for economic and social data, often in the form of modeling and projections. Advancements in computer and telecommunication systems have brought about a vast increase and diversification of information products. For example, just to mention one area in the information sector, the very nature of book publishing and distribution is changing in many countries. A large array of scientific, technical and business reference books are available in machine readable form. Booksellers use computer access to stocks and orders. Some publishers have entered the microcomputer software market. Moreover, a new service, "book packaging" has emerged that offers to manage the entire production of a book from finding an author to write it to selling it to a distributor /5/.

Why is it necessary to dwell on these examples when so many countries are still unable to introduce and apply the technology? There are several reasons. First, these examples indicate a trend that should soon reach all countries. "... data, information and new productive infrastructure should benefit not only the few; we cannot have a world divided between information 'poor' and 'rich'," warned Juan RADA [6]. Secondly, it is not too early to consider the need for information policies - in industrial information centers as well as in other settings - to safeguard the professional quality of information management. Thirdly, these trends bring us face to face with new educational needs.

The Impact of Information Technology

The process of change and its extrapolation into further developments have been described in so many disciplines, by so many analysts, that they have become one of the dominant themes in contemporary literature [7, 8, 9]. A brief and necessarily incomplete review of those trends which tend to affect information access and standardization requirements may be useful as an indication of the range of demands on planning new information education programs. Many of these phenomena are reflected not only in the interdisciplinary literature of telematics and policies, but also in the international press and other media.

- Various information technologies are converging and are being interconnected by telecommunication networks, increasing speedy access to information by multiple users and allowing for economics of scale.
- More and more governments begin to consider information products and services as resources of economic value and as the basis of scientific, technological and social development.
- The growth of service industries in many societies as well as the intensifiying role of the planning, marketing, and managerial components of manufacturing

industries result in increased internal data production.

- Especially two factors may be expected to increase the demands of users on information services: /a/ growing computer literacy and the use of personal computers, and /b/ the coverage of the potential benefits of the "microelectronic age" by television and other media. Both of these trends are making more and more people aware of the availability and "power" of information.
- At the same time when awareness of information availability is spreading, researchers, professional practitioners and managers are experiencing growing frustration in locating, evaluating, and using data because of the volume of the information flow inside and outside of organizations.
- Interdisciplinary research and development teams in many areas /agriculture and rural development, alternative energy resources, health and nutrition, etc./, create their own information products using computers. Accessing these data which often do not emerge in the open literature, requires skilled information intermediaries and interconnecting systems.
- There is a gradual convergence of the roles of the industrial planner, manager and information/telecommunication officer. A crucial need for an integrating role is arising without being met by current manpower developments.
- The rapid development of microelectronic technology and its application to information systems necessitates more emphasis on information science research in the areas of knowledge organization, management and use.
- Simultaneously with the need for the effective management of all types of information resources, there is evidence for a growing international concern with

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bringing various types of information professionals in closer cooperation.

Information Resource Management /IRM/

Development toward more effective data processing and information services in organizations began long before the rise of integrated information resource management as a new administrative function. During the last decades, research on information processes in decision making and problem solving has accelerated in several disciplines, notably in management science, public administration, communication science, economics, organizational psychology, political science and policy science. In practice, the IRM process has at least four longstanding traditions reflected in the literatures of /a/ management information systems and decision support systems, /b/ social science data systems, /c/ scientific and technological information systems, and /d/ networking. Events and policy developments in the United States, leading to the current state-of-the-art of IRM in practice and education, have been described by LEVITAN /10/.

The responses of industry and government to the managerial problems of proliferating paperwork and information processing problems have been similar in thrust, but very different in approach and implementation. For example, in the United States professional and trade associations took on the responsibility for introducing the IRM concept to conferences, symposia and workshops. Today they are extensively engaged in training programs for managers and information end users and in promoting policies and standards for information processing and products. At the beginning of 1979, the Association for Systems Management /ASM/ launched "Project 80's" in order to educate its membership by exploring the potentials of IRM to integrate text, image, voice and data resources. The Information Industry Association /IIA/ took the lead in producing background studies and manuals particularly useful to information officers. Their recent publication, "Understanding U.S. information policy: The Infostructure handbook" cov-

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ers economic, social and legal aspects of information work, government agencies, private organizations and resources for further study [11].

The federal government's concern with the administration of information resources culminated in the Paperwork Reduction Act of 1980. The law established the Office of Regulatory Affairs within the U.S. Office of Management and Budget effective of January 29, 1981, and charged it with developing and implementing standards and policy guidelines for IRM within the federal government. Each agency is required to designate a senior official for IRM who reports directly to the head of the agency. Responsibilities of IRM officials include effective application of technology and better allocation and use of funds [12].

There is no consensus on the professional qualifications of an information resource manager, nor has there been much progress toward establishing professional standards for IRM performance. In industrial companies, new job descriptions range from a slight revision of corporate librarianship to a comprehensive responsibility for integrated computer and telecommunication systems. In most companies the transition from separate library and electronic data processing functions to overall information management is incremental and often painful. However, the abundant literature on the subject reveals a certain consolidation of expectations of what an IRM should do.

The emerging role includes the planning, coordination and evaluation of all information resources and activities in the organization. Since the objective is to maximize the use of resources and assets, the manager must be concerned with both the content and the "containers" of information. As an intermediary between top management, the rest of the organization, and the external environment, the manager needs to understand the human dimensions of creativity and innovation in the organization. In support of this complex role, the manager may want to be aware of three areas where re-

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search and experience in recent years have produced certain new insights: the innovation process, information policies, and the utilization of research findings by industry.

Information Support for Innovation

The mechanisms for innovation include the acquisition of new scientific knowledge; technology transfer; trade relations and agreements; technical aid; education and training programs; and information dissemination and application. Each of these mechanisms depends on information. Consequently, top management may come to depend on the information specialist if the information system's creative support for the innovation process became evident. Such support may include technical advice to top management in identifying patent and licensing information, new techniques of project management or tools of technological forecasting.

Problem solving, an indispensable component of well-planned change, requires skills which use an information base /e.g. the analytic skills of need research or the non-analytic skills of brainstorming/ [13]. This is another domain where the information manager may become indispensable by locating not only the potential data resources but also descriptions of alternative processes. Today, information workers are often criticized for being overly concerned with the technical aspects and containers of information. Tomorrow, information managers will still be expected to be familiar with the technology, but they will be seen also as the top management's partners in problem solving. This capability is already being emphasized in relation to information provision in developing countries [14].

More than a decade ago, ZEIDA defined innovation as "the incorporation of one's own knowledge or that of others with the intention of generating or modifying a production process..." [15]. In his analysis of technological change, ZEIDA noted processes that depended on the fusion of information and action: planning, projecting, choice, agreement, testing,

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and the application of innovation. If we carry this approach one step further, we can clearly see the need for information services to support innovation-related problem solving and decisions in industry. But the provision of such information services will depend on the information manager's awareness of the tools, policies and records of technological innovation. For example, the successful assembling of documentation for the research, development and marketing of a new product depends on an understanding of policies that determine the availability of relevant data and documents /Figure 2/.

Information Policies

One of the problem of defining "policy making" is that it has been around for centuries in the form of statemanship, wisdom and governing. The study of the polis, the Greek city-state, was considered a noble art. But it was only a few decades ago that political and social scientists turned to the interdisciplinary study of the policy making process and its products /16/. Information policies may be defined as guidelines to the coordinated planning of information resources and their optimal utilization.

The growing interest in information policies is motivated not only by the traditional image of information as a basis of cultural heritage and scholarship, but also by the newer vies of information as a commodity of economic value. Transborder data flow - encompassing the transmission of financial and business data of banks, airlines, credit companies and multinational corporations - is considered by governments as a vital economic activity. The need for standards, the pricing of data communications, and the coordination of tariff policies represent problems that are mainly economic in nature.

Even the national telecommunication laws of various countries, enacted to protect the privacy of personal data passing through information networks, are said to be motivated by protectionist trade policies. Developing countries see the practices of international data transmission as merely

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another form of interference with their own technological and cultural independence. Several international organizations are engaged in efforts to reconcile conflicting interests, notably the Organization for Economic Cooperation and Development which produced guidelines for the transmission of personal data as well as a model voluntary agreement for its member states.

On the basis of the international interest in data transmission capability, one might assume that also industrial organizations value their information resources as economic assets. This, however, is seldom the case. The economic value of information resources and services to the user is difficult to measure or even estimate. Users, who normally do not distinguish between the content of the information and the system, are influenced by their subjective reactions to the content rather than by any economic consideration. In a recent study: "On the economies of information", ALKONYI, seeking to explain the lack of demand for information in Hungarian industrial companies, observed that computers and systematic planning techniques were underutilized by information services, but the services were even more underutilized by the technical personnel of the organizations [17]. A few research projects, currently exploring ways to assess information use and value in various countries, may result in policy shifts by governments and industry toward long-range information resource planning.

In addition to economic analyses, policy makers will need more intelligence on the impact of information and information services on the user. In this sense, there is an interesting similarity between the evaluation of a development project and the evaluation of an information system. HANSEN recommended benefit-cost criteria as well as financial and technical analyses for the evaluation of international technical aid projects, and observed that there was "an increasing awareness of the need to consider the 'social soundness' of projects. Who will benefit from the project?

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Where do the beneficiaries live? Who will be hurt? Many a project with a high economic rate of return has encountered serious problems because the analyst failed to ask such questions" [18]. Probably there are questions about the social and intercultural soundness of information we too, have to begin to ask.

The Use of Research in Industrial Organizations

Research utilization, a rapidly growing interdisciplinary field, combines the approaches of sociology, psychology, communication science and economics to study the communication modes and effectiveness of linking decision makers with relevant sources of knowledge. The linking process may be studied when directed from the research sector to the users or it may be viewed from the vantage point of decision makers and their patterns of information processing and use [19, 20, 21, 22, 23]. The literature includes studies of directed research, that is, investigations carried out in order to solve specific problems, and studies reporting generalizable findings which are then published, abstracted or otherwise repackaged as information sources on current research.

The U.S. National Science Foundation, concerned with the lack of public understanding of how basic research may produce unexpected practical benefits for industrial development, presented a brief review of such cases /solar collectors, fibers for optical communication, disease resistant hybrid corn, etc./ [24]. Famous cases can easily demonstrate the connection between nondirected research and its application to goals which had not been foreseen. But even well documented case histories fail to show the communication process by which research results are diffused. In social science research the connection is even more elusive, although managers are supposed to be users of social science research. CAPLAN outlined the continuum of knowledge use as "diffusion", "utilization", and "application" [25]. There are numerous other useful interpretations. Knowledge utilization is most

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often seen as a one-way process either from the researcher's of from the applier's point of view.

For information resource managers who act as intermediaries between general management and a large variety of information sources, use of the unidirectional communication model would be a serious mistake. Rather, I offer a synergetic view of information dissemination in which the initiatives, attitudes and actions of several cooperating individuals are interwoven /Figure 3/. This process includes the following phases in the transmission of knowledge:

Knowledge production /research/
Information production /synthesis of research findings/
Dissemination of findings /reports, papers, synopses, abstracts, etc./
Information seeking
Information acceptance
Information utilization
Conversion of information into knowledge
Knowledge utilization
Application and testing
Feedback to researcher
Evaluation of utilization

The key element in this model is the concept of "information acceptance" as the basis of all further actions of the user in the knowledge cycle. At the individual level - and it is here that information use has to take place - effective information conversion and application are hardly possible without the act of acceptance on part of the user. Thus, psychological understanding and communication skills are essential assets for information intermediaries.

The foregoing examples attempted to indicate the new challenges industrial information officers face. Education and continuing education programs are needed to develop strengths in planning, benefit-cost analysis, systems design, and applied research skills for information need assessment

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and impact evaluation. However, techniques and skills need to be infused by an understanding of the relationships of innovation, the role of policies, and the use of research findings for decision makers.

Realities of the Workplace

The industrial organization has been undergoing drastic transformations worldwide. New economic requirements, production goals, and national plans are posing new demands. Changes in the external environment influence the operations of companies by placing top management into new situations, often with unexpected economic and political consequences. The management's task is then to use human and knowledge resources to fulfill new objectives. As AJOUGU observed, "... the individual in management is expected to know the ever-evolving main concepts and hypotheses about human behavior" [26].

The information unit of the company usually feels the impact of any external and internal change the organization is experiencing. The more familiar information officers are with the administrative and communication channels of their organizations, the more support they can provide to the various levels of management, research, development and operations. This support requires that information pools, traditionally handled by separate units in the organization - daily administrative records, statistical data, laboratory records, technical documents and libraries, - be better coordinated and that the information officer works in close cooperation with other officials. There is a useful body of literature that can prepare the information officer for coping with organizational change. There are also handbooks, some of them published by UNESCO and UNIDO, that contribute to a better understanding of various information functions. Therefore, this paper will concentrate on the areas where internal policies may help the information officer in working with top management and with other organizational units.

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CILLIA identified the following organizational resources, often attached to separata managerial domains: human resources /people/; information resources /media/; technology /systems/; facilities /offices/; financial resources /money/; and materials /supplies/. CILLIA suggests that in the future information resource management will integrate all the various media of an organization [27]. Although not all of us may agree with his separation of media and systems, his scheme indicates relationships and spheres of influence that are characterisitic for most organizations.

Factors Affecting Information Resource Management

/Does not include the IRM's own qualifications/

- Goals and priorities of the company;
- External economic conditions and internal financial constraints;
- Characterisitics of the line of industrial product or service the company produces;
- Nature of the organization and style of management;
- Scope of support services /utilities, technologies, technical assistance, maintenance, etc./;
- Top management's perception of the utility of information systems and services;
- Relationship between the information unit and other departments and units;
- User expectations from and appreciation of information services;
- Extent of interdisciplinary work in the organization;
- Current policies on proprietary information handling;
- Participation in external cooperative information activities.

Internal Policies for Information Management

In most industrial information units, emphasis is placed on resources and processes. When information officers are faced with decisions /selecting data base vendors, justifying the microfilming of records or starting a current aware-

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ness service/, all too often the choice of a course of action has to be made in the absence of policy guidelines. Under favorable circumstances, time and management support may permit an assessment of need for the proposed change. However, there is seldom any time or concern for an ad-hoc review of existing laws, agreements, standards and protocols that may affect the cost and effectiveness of a new operation. Examples include national laws on personal data and privacy, copyright and patents, and standards for documentation, computers and information processing. Diverse issues such as terminology, the exchange of bibliographic data, and system interconnection in networks have been the targets of standardization. International treaties and agreements govern numerous aspects of trade and technology transfer. And it should be emphasized that cultural tradition and national priorities affect information policies even stronger than these legal provisions. Therefore, internal information policy guidelines, developed before project deadlines begin to threaten, could lead to more systematic long-range planning and better decisions in organizations. It is in this gray area of no-policies where information resource management can play a significant role. Data and information handling processes that are prone to the influence of national and international information policies may be identified in every company.

Examples of Internal Policy Needs

User needs and services

- o Priorities in providing information support to company goals;
- o Objectives and techniques for assessing information needs of potential and actual users;
- o Services for meeting specific needs internally and externally: priorities, searching, bibliographic compilations; free vs. fee-based information dissemination;

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- o Information support to management at different levels;
- o Relationships with research, development, production, marketing;
- o User training;
- o Access to proprietary information; security measures: physical facilities, systems and people;
- o Personal information needs of professional staff for research, writing, consulting, conference attendance.

Planning and assessment

- o Operating within financial constraints;
- o Benefit-cost analysis of proposed information services;
- o Coordinating various information functions: data management, media management, records management, documents and libraries;
- o Phased development of new information services;
- o Line of authority in information-related decisions; reporting requirements; participation in staff meetings;
- o Procurement of information resources and technology;
- o Developing cooperative information projects in the company;
- o Networking and system interconnections;
- o Selection of measurements and instruments for quality control, monitoring and evaluation;
- o Facilities planning.

Information resources

- o Internal records: inventory, retention decisions, conversion from manual to computer assisted systems; and storage and retrieval;
- o Control of technical and research reports, patent collections and graphics;
- o Integration of internal and external resources in data, text, voice and image representing information;

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- o Organizational communications: taping of meetings, conferences, workshop; external contacts through teleconferencing and electronic message systems;
- o Resources created by in-house research, short-term projects, consultants and technical advisors.

Systems and technology

- o Review of existing files, document sets and other information resources; review of the alternatives of centralizing them or maintaining them in their current locations as resources in a distributed information system;
- o Working with management and other organizational units on planning gradual changes in information handling, preferably through a company-wide task force created by top management;
- o Assessing the potential use of existing computer and communication technology for new tasks; developing budget proposals for new technology where necessary, indicating its expected impact on productivity;
- o Vendor selection,procurement alternatives, maintenance provisions;
- o Phased development, implementation and evaluation of the information system; documentation relating to operations;
- o Review of standards and protocols for information processing /file formats, bibliographic formats, subject analysis, data base development, data elements and interchange formats, telecommunications, micrographics, reprograhpy, etc./;
- o Provisions for the security of physical facilities, systems and communications;
- o Managing the transition from traditional to modern information management through various stages of implementation; training the staff, orienting the end user, and disseminating company-wide information about new developments.

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Professional responsibilities

- o Being concerned with the social, cultural and ethical implications of transmitting information;
- o Keeping up-to-date on developments in information and telecommunication laws, regulations, agreements and standards;
- o Informing top management about such developments when they have a potential impact on company information;
- o Fostering a supportive and cooperative climate in the organization in which information can be perceived as a general asset rather than a resource localized in an information unit or library;
- o Serving as internal technical adviser on information-related matters to the company;
- o Serving as a link to expertise and resources outside of the company; developing referral relationships in order to expand the opportunities of use relevant information wherever it is available.

Skills and Insights

As a new approach to the systematic improvement of the use of resources, information resource management requires certain broad areas of knowledge, professional insights, and specialized skills. Some of these may already be present in the staff of industrial organizations, but they need to be applied in new configurations. The advancement and expansion of information technology have been so rapid, and their social impact so complex, that educational planners experience a real urgency to prepare professionals for management in the changed information environment. In the United States industry, government and academic institutions have been searching for the right formulas for course content and training experience. The broad areas of knowledge that would form the foundation of IRM are reflected, in diverse ways, in their programs, curricula and expositions [28, 29, 30].

The specialized skills most often mentioned in the literature may be grouped in four categories:

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Analytical skills:

Systems planning and design; methodologies for need assessment and evaluation research; data-, word-, and information processing; benefit-cost analysis; budgeting; analysis of organizational hierarchies and processes; technology assessment; information analysis; search strategies; and issue analysis; basics of information market analysis.

Policy-related skills:

Identifying relationships between the components of national information and communication infrastructures; review of policy instruments; recognizing national and international policies that affect local information processing; development, review and adaptation of information policies within the organization; decision-making skills; use and dissemination of policy research.

Technological skills:

Know-how of information and telecommunication technologies and applications; rapid orientation to emerging technologies; use of microcomputers for innovation; word and information processing; fundamentals of data base management; networking; cooperating with other units in the organization in technology applications.

Communication skills:

Interpersonal communication; group techniques; planning meetings and conferences: leadership skills; supervision of staff; interdisciplinary work; application of communication skills to information marketing and dissemination; oral and written presentations; demonstration using audiovisual techniques; user training; repackaging information for purposes of the end user.

Professional insights needed for managerial leadership are more difficult to identify and convey than theories or skills. An understanding of the environment, a vision of possibilities, and an ability to motivate people are elusive hu-

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man qualities. Nevertheless, from the rather chaotic trend toward IRM, we can distil a few observations that may help information practitioners and managers to sense the shape of this new role. What is needed is an almost instinctive understanding of the following.

1. Information is a corporate resource and needs to be managed accordingly. But it would be misleading to envision information resource management as a single overarching responsibility, except in small organizations or at the top level in larger organizations. The IRM function has many facets, and entry-level professionals are usually expected to be specialized in one area but understand the relationships with other areas.

2. The business of the organization needs to be understood in order to plan and utilize its information resources wisely.

3. The internal relationships and processes of organizational planning, R & D, management, production and marketing, and the organization's links with the outside world produce both needs and new information.

4. People are the carriers of information that is often unique and potentially constructive or damaging, depending on where, when and how it is applied.

5. Technology does not represent a solution to information problems unless it orients us to dilemmas that run below the surface, and unless it is used in conjunction with other problem solving tools and processes.

6. The real difficulty in understanding the relationship of information/telecommunication policies to internal information activities is that while several previously distinct borderlines among technologies are disappearing, policies are expected to be made

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on the basis of the type of technology /copyright for computerized data bases or standards for microfiche/.

7. The end user of information has become the target of attention in recent literature on system development and evaluation. But we have little understanding of why some people are comfortable in their personal and informal information world while others readily turn to formal systems.

8. The first barrier information resource managers have to break down in a situation where they have to justify their proposals or actions is the ambiguous and burdensome nature of the information-related terminology.

9. We need to foster our ability to cope with people's resistance to change as much as with the changes themselves.

10. Most everybody acknowledges the phenomenon that development policies in every country are culturally determined and social value oriented, but managers - especially technical advisors - often act as if information could be isolated from the mainstream of development and handled uniformly in every environment. The manager as adaptor and cultural interpreter has not yet become a reality.

IRM at Syracuse

I will briefly introduce our program in order to initiate interaction with other information education programs. In 1979, the Syracuse University School of Information Studies began a Master of Science in Information Resource Management /M.S.I.R.M./ program. The course of study is comprised of 54 graduate credit hours /normally accomplished in two years/, including research and sometimes field work. The program may be shorter for applicants with appropriate experience. Within the requirements of the program, students from

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other countries may select to study information issues or acquire skills especially relevant to their country.

Years of planning and gathering feedback from business managers, public administrators, information specialists and academic departments preceded the announcement of the new program. The faculty and students participated in the planning from the beginning. The chief architect of the program, then dean Robert S. TAYLOR, described the criteria for an academic IRM study in these words: "First, it should be institution- and device-free. That is to say, the concern of information managers is with the generation, organization, and utility of information messages, not with computers, libraries, data processing, accounting systems, management information systems, etc. ... Second, the information manager has two unique areas of expertise: intellectual technologies ... and the uses of information in varying work environments. The third concern is the development of the capability to manage information resources so that the content of ... the information, will have pay-off in terms of better decisions and better allocation of resources" [31].

The following areas are emphasized by the curriculum:

Systems Analysis and Design
Designing Computer-Based and Manual Retrieval Systems
Records Management
Organizing Corporate Information Centers
Training Staff and Other Computer System Users
Reducing Paperwork
Evaluating Information System Vendor Proposals
Office Automation
Gathering and Evaluating Information for Strategic Planning and Marketing
Managing Information Operations and Databases [32].

The program was reviewed and revised in 1982, in order to utilize feedback by employers and students. /Current course requirements are indicated in Figure 4/. Graduates

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have been successful in their placement, and thus the program is accomplishing its professional and pragmatic goals. But the School of Information Studies also conducts research projects, and the search for a better understanding of information needs and processes continues. So does educational planning, guided by research on the one hand and by professional insights on the other.

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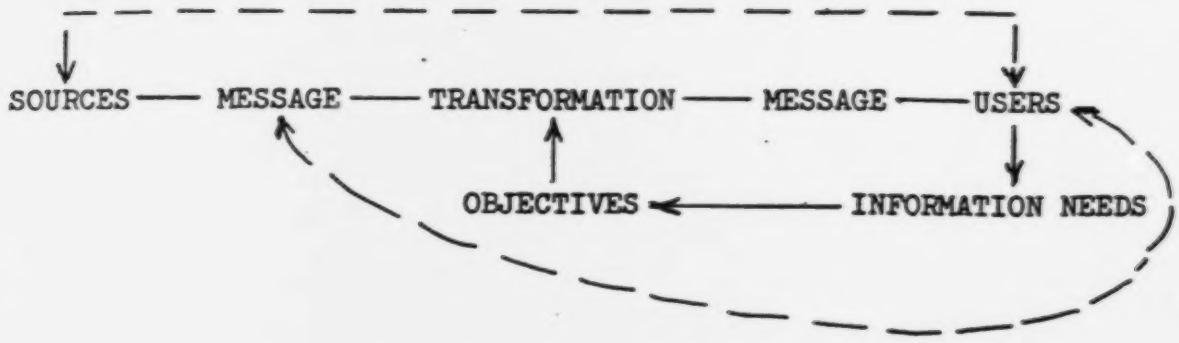

PHASES:

THE GENERATION OF INFORMATION

SOURCES, CHARACTER, FORM, CONDITIONS OF USE, CREDIBILITY, QUANTITY, QUALITY, INTENT, PROCESS OF CREATION, ETC.

THE COMMUNICATION OF INFORMATION

CHANNELS, METHODS, PROCESSES (THE TECHNOLOGY AND THE PSYCHOLOGY) TRANSFORMATION, REPACKAGING FOR USER, ETC.

THE UTILIZATION OF INFORMATION

IDENTIFICATION, MATCHING WITH NEEDS, LOCATION, ORGANIZATION INTO APPROPRIATE FORM, EVALUATION, INTERPRETATION, USAGE

Figure 1

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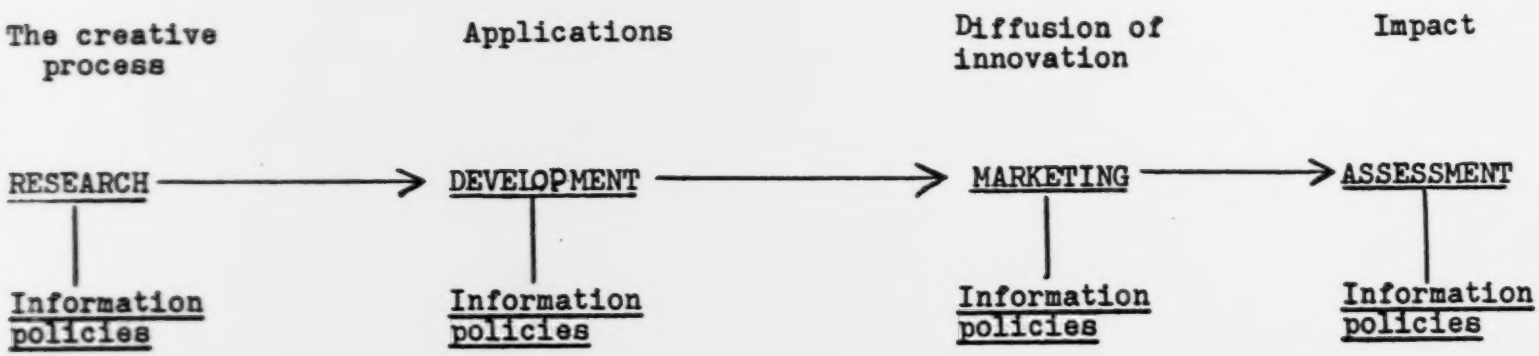
Information policy areas relating to innovations



Research fundung	Knowledge gap	Market research	Technology assessment
Grant policies	Diffusion of research	Market techniques	Impact statements
Contracts	Technology transfer	Factors affecting diffusion	Use of indicators
Psychology of creative process	Domestic	Public awareness	social
Ownership	Foreign	Mass media	health
Patent process	Industrialized countries	Public interest law	environmental
Trademarks	Developing countries	Consumerism	Data banks
Secrecy	Laws/regulations	Repackaging of information	Modelling
Breach of secrecy	Federal agencies		
Projection techniques			

Figure 2

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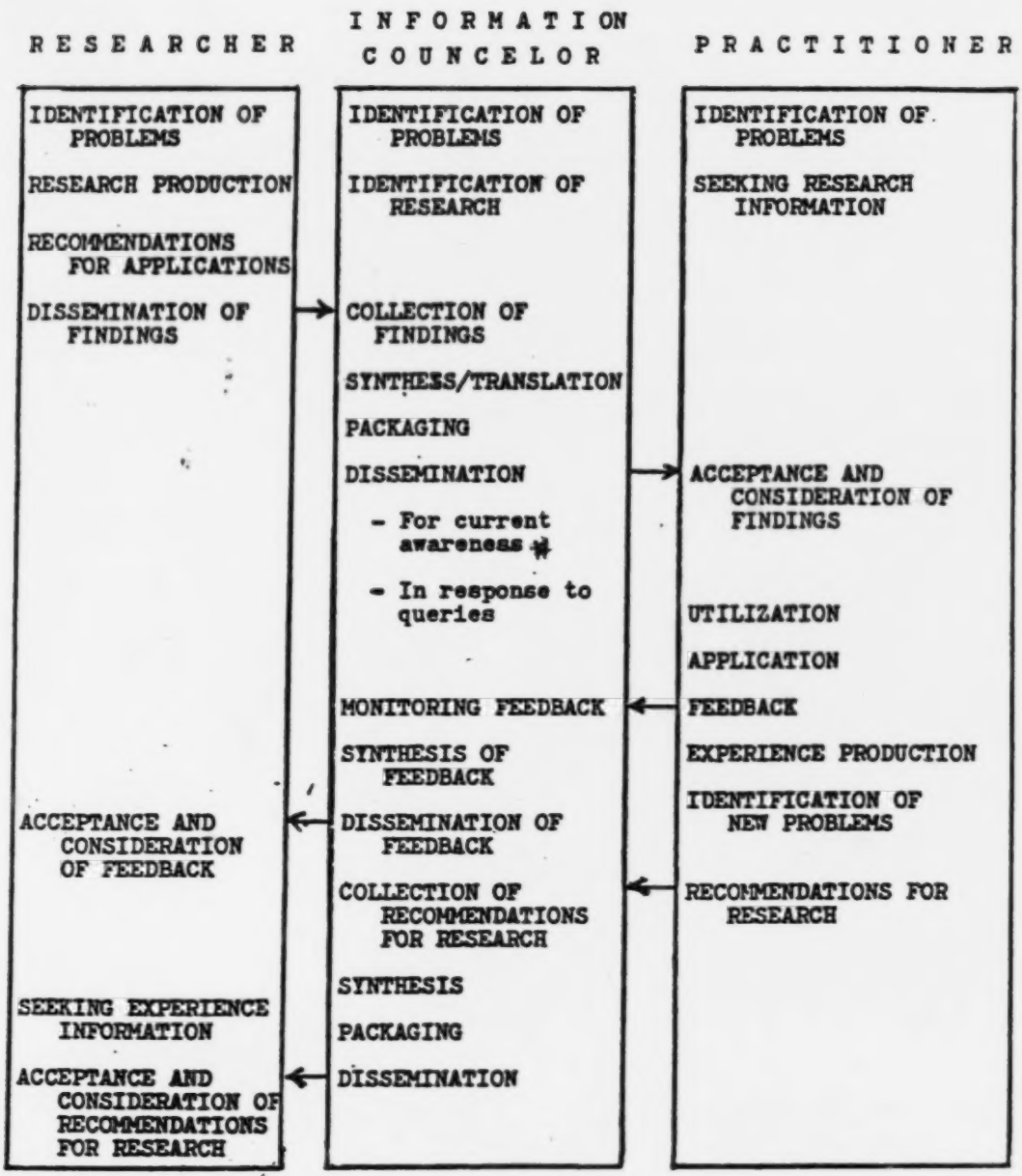

Figure 3

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SYRACUSE UNIVERSITY SCHOOL OF INFORMATION STUDIES

COURSE REQUIREMENTS FOR MS/IRM

Primary Core /12 Credits/

SYSTEMS	INFORMATION	MANAGEMENT
IST 552 Information Systems Analysis	IST 655 Foundations of Information Science	IST 506 Management Principles
	IST 528 Concepts of Information Resources	

Secondary Core /18 Credits, 6 in each area/

IST 557 Microcomputer-Based Information Systems	IST 60X Discipline-Based Information /Humanities, Social Science, Scientific, Medical/	IST 535 Records Management
IST 571 Computer Programming for Non-Numerical Information Processing	IST 607 Governments and Information	IST 641 Behavior of Information Users
IST 653 Telecommunications for IRM	or	IST 647 Seminar in Management Principles for Information Services
IST 654 Office Automation	IST 626 Business Information	IST 652 Information Processing for Managers
IST 656 Computer Technologies for IRM	IST 637 Online Retrieval Services	IST 675 Evaluation of Information Systems
IST 657 Basics of Computerized Retrieval Systems	IST 638 Indexing and Abstracting Systems and Services	IST 683 Economics of Informatics
IST 658 Advanced Computerized Retrieval Systems	IST 682 National and International Information Policies	
IST 659 Database Management Systems		
IST 671 Programming Techniques for Information Systems		

Area of Concentration and Electives /21 Credits/

Research Project /3 Credits/

Figure 4

Source: Syracuse University School of Information Studies
"Master of Science Information Resources Management" brochure

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